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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/084,221	02/28/2002	Kazuya Ohuchi	220212US2	5086

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ALEXANDRIA, VA 22314

EXAMINER

NGUYEN, JOSEPH H

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 06/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/084,221

Applicant(s)

OHUCHI, KAZUYA

Examiner

Joseph Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of claims 1-12 in Paper No. 6 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Therefore, claims 1-12 are prosecuted whereas claims 13-18 are withdrawn from consideration.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Alieu et al.

Regarding claim 1, Alieu et al discloses on figure 3 a semiconductor device comprising a first conductive type semiconductor region 9 formed in a semiconductor substrate 2; a gate electrode 3 formed on said first conductive type semiconductor region; a channel region formed immediately below said gate electrode in said first conductive type semiconductor region; and a second conductive type first diffusion layer

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7, 8 constituting source/drain regions formed at opposite sides of said channel region in said first conductive type semiconductor region; said gate electrode being formed of polysilicon silicon germanium in which germanium concentration of at least one of a source side and drain side is higher than that of a central portion 3-3(col. 4, lines 8-11).

Regarding claim 3, Alieu et al discloses on figure 3 the germanium concentration in said gate electrode is continuously decreased from the drain and source sides to the central portion.

Regarding claim 4, Alieu et al discloses on figure 3 a second conductive type second diffusion layer formed between said first diffusion layer and said channel region in said first conductive type semiconductor region and having a lower impurity and a shallower depth than said first diffusion.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alieu et al as applied to claim 1 above.

Regarding claim 2, Alieu et al discloses on figure 3 substantially all the structures set forth in the claimed invention except the germanium concentration in said gate electrode being continuously increased from the drain side to the source side. However,

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it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Alieu et al by having the germanium concentration in said gate electrode being continuously increased from the drain side to the source side for the purpose of improving the current flow in a semiconductor transistor, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alieu et al as applied to claim 1 and further in view of figure 8 of the acknowledged prior art (APA).

Regarding claim 5, Alieu et al discloses on figure 3 substantially all the structures set forth in the claimed invention except an oxide layer being formed between said gate sidewall and an edge of said gate electrode. However, figure 8 of (APA) discloses that an oxide layer 12 being formed between said gate sidewall 18 and an edge of said gate electrode 32. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Alieu et al by having an oxide layer being formed between said gate sidewall and an edge of said gate electrode for the purpose of providing an effective electrical insulation around the gate of a semiconductor transistor.

Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alieu et al.

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Regarding claims 6, 8-9, Alieu et al discloses on figure 3 substantially all the structures set forth in the claimed invention except a germanium concentration in a region with a thickness substantially identical to the thickness of said oxide layer being 1.5 to 2 times the germanium concentration of a central portion of said gate electrode. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Alieu et al by having a germanium concentration in a region with a thickness substantially identical to the thickness of said oxide layer being 1.5 to 2 times the germanium concentration of a central portion of said gate electrode for the purpose of improving the current flow in a semiconductor transistor since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 7, Alieu et al discloses on figure 3 substantially all the structures set forth in the claimed invention except the germanium concentration in said gate electrode being continuously increased from the source side to the drain side. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Alieu et al by having the germanium concentration in said gate electrode being continuously increased from the source side to the drain side for the purpose of improving the current flow in a semiconductor transistor, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over figure 8 of (APA) in view of Alieu et al.

Regarding claims 10, figure 8 of (APA) discloses substantially all the structures set forth in the claimed invention except a germanium concentration of at least one of a source side and a drain side being higher than a central portion. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify (APA) by having a germanium concentration of at least one of a source side and a drain side being higher than a central portion for the purpose of compensating the short channel effect in a semiconductor transistor (see Abstract of Alieu et al).

Regarding claim 12, figure 8 of (APA) and Alieu et al together disclose all the structures set forth in the claimed invention.

Regarding claim 11, (APA) and Alieu et al disclose substantially all the structures set forth in the claimed invention except the germanium concentration in said gate electrode being continuously increased from the drain side to the source side. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify (APA) and Alieu et al by having the germanium concentration in said gate electrode being continuously increased from the drain side to the source side for the purpose of improving the current flow in a semiconductor transistor, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent 6312995 B1 to Yu discloses a MOS transistor.

US Patent 6545317 B2 to Hokazono et al discloses a gate electrode with a sidewall.

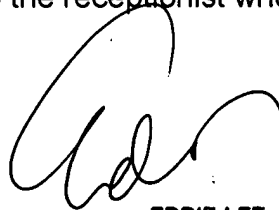
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (703) 308-1269. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 308-7382 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JN
May 30, 2003



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800